Oakland Operations Office
Unaddressed Technology Needs

Energy Technology Engineering Center (ETEC)

Process to Decontaminate Lead for Recycle (OAKNEED 12, OAK Priority 12 of 19)

A method is needed to remove radioactive contamination from lead so the lead can be recycled to any commercial use and the radioactive waste will not be mixed waste. The process must be able to treat irregular lead shapes and lead where radioactive contamination has impregnated the lead. Current baseline technologies (surface scraping or mechanical cleaning) are not effective on irregularly shaped lead pieces or where the radioactive contamination has impregnated the lead. Further information is contained in the Technology Need Document which can be found at **www.oak.doe.gov/wmpp/decontam/decon_m.html**.

Contact: Ravnesh Amar (ETEC, Boeing) @ 818-586-5243 or Mike Lopez (DOE OAK) @ 510-637-1633 (mike.lopez@oak.doe.gov)

Lawrence Berkeley National Laboratory (LBNL)

DNAPL Plume Characterization (OAKNEED 4, OAK Priority 4 of 19)

LBNL needs a method to locate DNAPLs in fractured rock, and to locate the contact between a high permeability geological unit and low permeability unit. The contact is expected to be at approximately 100 feet below ground surface. The DNAPL must be characterized within the next year. The plume of interest is called the "Old Town Plume" and contains elevated concentrations of PCE and TCE along with lower concentrations of other halogenated hydrocarbons, including: 1,1-DCE; cis-1,2-DCE; 1,1-DCA; 1,2-DCA; 1,1,1-TCA; 1,1,2-TCA; carbon tetrachloride; chloroform; and vinyl chloride. The maximum concentration of total halogenated hydrocarbons detected in wells monitoring the Old Town Plume was over 200 mg/L. The Old Town Plume is migrating down a steep hill which is up gradient of a creek. Current baseline technology is pump-and-treat which is expected to last 30 years. Further information is contained in the Technology Need Document which can be found at **www.oak.doe.gov/wmpp/contam/contam_c.html**.

Contact: Iraj Javandel (LBNL, UC) @ 510-486-6106 (ijavandel@lbl.gov) or Hemant Patel (DOE OAK) @ 510-637-1568 (hemant.patel@oak.doe.gov)

Removal of Tritium in Groundwater (OAKNEED 8, OAK Priority 8 of 19)

LBNL needs a cost effective technique to remove tritium from groundwater. The tritiated groundwater is reaching the surface through hydraugers. The hydraugers were installed to lower the water table to keep landslides from forming. The maximum concentration of tritium detected in the slope stability wells is 33,000 pCi/L. The issue of tritium in the groundwater is a major concern to the LBNL stakeholders and has become a volatile issue. There is no current baseline technology for the removal of tritium from groundwater. CA regulations prevent the tritium from being reinjected back into the subsurface. Further information is contained in the Technology Need Document which can be found at **www.oak.doe.gov/wmpp/contam/contam_c.html**.

Contact: Iraj Javandel (LBNL, UC) @ 510-486-6106 (ijavandel@lbl.gov) or Hemant Patel (DOE OAK) @ 510-637-1568 (hemant.patel@oak.doe.gov)

Lawrence Livermore National Laboratory (LLNL) — Main Site

Innovative In Situ Destruction Technologies to Aggressively Remediate Source Areas (OAKNEED 2, OAK Priority 2 of 19)

LLNL-Main Site needs innovative in situ destruction technologies to aggressively remove contaminants from source regions of groundwater plumes. Contaminants at the source exist in both the fine-grained and the coarse-grained sediments. Contaminants are primarily VOCs. Current baseline technology is pump and treat. LLNL-Main Site Restoration program is currently looking at Hydrous Pyrolysis and Dynamic Underground Stripping as potential solutions to this need. Further information is contained in the Technology Need Document which can be found at **www.oak.doe.gov/wmpp/contam/contam_c.html**.

Contact: Bob Bainer (LLNL, UC) @ 510-422-4635 (bainer1@llnl.gov) or Jim Littlejohn (DOE OAK) @ 510-422-0752 (jim.littlejohn@oak.doe.gov)

Cost Effective Way of Separating Tritium from VOCs in Groundwater (OAKNEED 5, OAK Priority 5 of 19)

LLNL-Main Site needs a cost effective, in situ technique to remove VOCs from tritiated groundwater. The Record of Decision (ROD) mandates that groundwater with tritium concentrations above the MCLs cannot be processed at the surface. The VOCs are in the 5-8 ppm range and the tritium is at 20,000-100,000 pCi/L range. Tritium contamination is in a 60ft x 60ft zone through the vadose zone, down to the groundwater. The regulators want to remove the VOCs but leave the tritium in place to decay naturally. The current baseline technology for remediating the VOCs in the tritiated groundwater is to pump contaminated groundwater to the surface, remove VOCs and return the tritiated water to the subsurface. The VOCs are remove using a combination of vapor extraction, air stripping, and/or abiotic dehalogenation. The process is done in a closed loop system so that the tritium is not allowed to escape to the atmosphere. Further information is contained in the Technology Need Document which can be found at **www.oak.doe.gov/wmpp/contam/contam_c.html**.

Contact: Bob Bainer (LLNL, UC) @ 510-422-4635 (bainer1@llnl.gov) or Jim Littlejohn (DOE OAK) @ 510-422-0752 (jim.littlejohn@oak.doe.gov)

Mobile Non-Destructive Assay for TRU Waste Boxes (OAKNEED 6, OAK Priority 6 of 19)

There are currently no assay systems, mobile or fixed, that can properly assay the isotopic inventory of transuranic (TRU) waste contained in waste boxes. The assay system should consist of a passive measurement system which will have the ability to qualify plutonium 238, 239, 240, and americium 241 isotopic mass ratios; total plutonium 239 fissile equivalent; total alpha curie content; and thermal power of waste in the container. Results should be provided in paper and electronic format in accordance with the Performance Demonstration Program requirements for the Waste Isolation Pilot Project (WIPP). The use of a mobile system will reduce costs for qualifying the waste boxes by eliminating the need for each facility to construct its own assay facility and maintaining a qualification of the assay system. Further information is contained in the Technology Need Document which can be found at **www.oak.doe.gov/wmpp/waste/waste_m.html**.

Contact: John Bowers (LLNL, UC) @ 510-422-7756 (bowers3@llnl.gov) or Roy Kearns (DOE OAK) @ 510-422-1168 (roy.kearns@oak.doe.gov)

Lawrence Livermore National Laboratory (LLNL) — Site 300

Innovative Technology for DNAPLs - Bldg. 834 (OAKNEED 1, OAK Priority 1 of 19)

LLNL-Site 300 needs innovative technologies for the characterization and remediation of DNAPLs in soil and groundwater. The technology performance should be risk based, not MCL based. Building 834 is the thermal cycling building and central facility. The facility used TCE as a coolant brine and there have been leaks and spills. TCE concentrations of 800,000 ppb have been detected in groundwater, with suspected DNAPLs in the vadose zone and groundwater. Diesel fuel and 2-ethylbutylorthosilicate (T-BOS) contamination is also present as LNAPLs. Volatilization of VOCs have the potential of impacting the workers in Bldg. 834. The thickness of the saturated zone is in the 10-40 ft. range. The regional aquifer sits 320-360 ft below ground surface and is approximately 280ft below the contaminated aquifer. The groundwater is a perched water table on a hillside. Further information is contained in the Technology Need Document which can be found at **www.oak.doe.gov/wmpp/contam/contam_c.html**.

Contact: John Ziagos (LLNL, UC) @ 510-422-5479 (ziagos1@llnl.gov) or Paul Ko (DOE OAK) @ 510-422-1075 (paul.ko@oak.doe.gov)

Cost Effective Technology to Remove Tritium from Groundwater In Situ (OAKNEED 13, OAK Priority 13 of 19)

There is a need for a cost effective technology to remove tritium from groundwater. A plume of tritium in groundwater extends 600-2,000 ft from Pits 3 and 5 respectively. Maximum tritium activities are 1,900,000 pCi/L. The tritium generally occurs in an extensive perched water-bearing zone. Regions with the highest groundwater tritium activity also contain up to 10 ug/L of TCE and 120 pCi/L of uranium. Water levels can rise rapidly after rainfall commences in winter due to topographically enhanced recharge near the pits. Regulators have agreed to a natural attenuation plan with extensive monitoring along with a contingency plan.
A local Stakeholder Organization has hired a third party to check the agreement and make sure that the information provided by LLNL-Site 300 is accurate. Further information is contained in the Technology Need Document which can be found at **www.oak.doe.gov/wmpp/contam/contam_c.html**.

Contact: John Ziagos (LLNL, UC) @ 510-422-5479 (ziagos1@llnl.gov) or Paul Ko (DOE OAK) @ 510-422-1075 (paul.ko@oak.doe.gov)

Stanford Linear Accelerator Center (SLAC)

Innovative Technology to Investigate Geology and Groundwater Flow in Fractured Rock (OAKNEED 7, OAK Priority 7 of 19)

There is a need for an innovative technology to investigate geology and groundwater flow characteristics in fractured rock. The geologic and hydrologic situation at SLAC is as follows: Eocene and Miocene marine sedimentary sandstone, siltstone, and shale up to 4000ft thick. Upper Pliocene and lower Pleistocene non-marine silts, sands, and gravels up to 1000ft thick. Limited alluvial deposits up to 22ft thick. Artificial fill up to 70ft thick. Ground water depth is from a few feet to approximately 30ft. Most of the groundwater is in sedimentary rock and the soil has very low permeability. Groundwater is contaminated with 4000 ppb VOCs, volume and areal extent undetermined. May be DNAPLs on site - there are surface fractures where DNAPLs could be located. Domestic use of groundwater is highly unlikely. Naturally occurring sulfite levels (200-400 mg/L) and levels of total dissolved solids (3000-10,000 mg/L) are more than double those set for drinking water standards. Further information is contained in the Technology Need Document which can be found at **www.oak.doe.gov/wmpp/contam/contam_c.html**.

Contact: Helen Nuckolls (SLAC) @ 650-926-3371 (Hnuckolls@slac.stanford.edu) or Hemant Patel (DOE OAK) @ 510-637-1568 (hemant.patel@oak.doe.gov)